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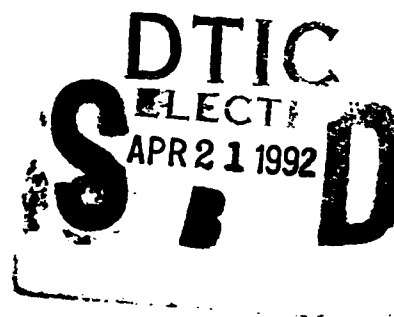
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INTEGRATED INFORMATION SUPPORT SYSTEM (IISS)
Volume VIII - User Interface Subsystem
Part 41 - Electronic Documentation System (EDS) Parser Unit Test
Plan

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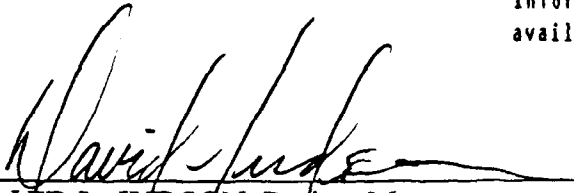WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433-6533

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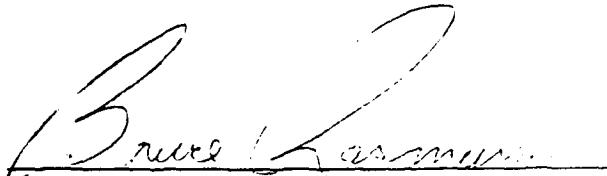
This technical report has been reviewed and is approved for publication.

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DAVID L. JUDSON, Project Manager
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DATE 25 July 91

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This unit test plan establishes the methodology and procedure to be used to test the capabilities of the Electronic Documentation System (EDS) Parser computer program.

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FOREWORD

This technical report covers work performed under Air Force Contract F33600-87-C-0464, DAPro Project. This contract is sponsored by the Manufacturing Technology Directorate, Air Force Systems Command, Wright-Patterson Air Force Base, Ohio. It was administered under the technical direction of Mr. Bruce A. Rasmussen, Branch Chief, Integration Technology Division, Manufacturing Technology Directorate, through Mr. David L. Judson, Project Manager. The Prime Contractor was Integration Technology Services, Software Programs Division, of the Control Data Corporation, Dayton, Ohio, under the direction of Mr. W. A. Osborne. The DAPro Project Manager for Control Data Corporation was Mr. Jimmy P. Maxwell.

The DAPro project was created to continue the development, test, and demonstration of the Integrated Information Support System (IISS). The IISS technology work comprises enhancements to IISS software and the establishment and operation of IISS test bed hardware and communications for developers and users.

The following list names the Control Data Corporation subcontractors and their contributing activities:

SUBCONTRACTOR	ROLE
Control Data Corporation	Responsible for the overall Common Data Model design development and implementation, IISS integration and test, and technology transfer of IISS.
D. Appleton Company	Responsible for providing software information services for the Common Data Model and IDEF1X integration methodology.
ONTEK	Responsible for defining and testing a representative integrated system base in Artificial Intelligence techniques to establish fitness for use.
Simpact Corporation	Responsible for Communication development.
Structural Dynamics Research Corporation	Responsible for User Interfaces, Virtual Terminal Interface, and Network Transaction Manager design, development, implementation, and support.
Arizona State University	Responsible for test bed operations and support.

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Appendices

SECTION 1

GENERAL

1.1 Purpose

This Unit Test Plan (UTP) establishes the methodology and procedures used to adequately test the capabilities of the computer program identified as the SGML Parser. The SGML Parser is one configuration item of the Integrated Information Support System (IISS) Electronic Documentation System (EDS).

1.2 Project References

[1] Systran, ICAM Documentation Standards , IDS150120000C, 5 September 1983.

[2] International Organization for Standardization, Information Processing - Text and Office Systems - Standard Generalized Markup Language (SGML) , ISO 8879, 15 October 1986.

[3] International Organization for Standardization, Office Document Architecture/Office Document Interchange Format , ISO/DP 8613/1-6, October 1985 (Draft).

[4] American National Standards Institute, American National Standard for Information Systems - Computer Graphics - Metafile for the Storage and Transfer of Picture Description Information , ANSI X/3.122-1986, August 27, 1986.

[5] Structural Dynamics Research Corporation, Form Processor User's Manual , UM 620244200A, 16 February 1987.

[6] Structural Dynamics Research Corporation, Virtual Terminal Operator Guide , OM 620244000A, 16 February 1987.

[7] M.E. Lesk, LEX - Lexical Analyzer Generator, IS Workbench for VAX/VMS Programmers Guide .

[8] Structural Dynamics Research Corporation, <u>Form Processor Development Specification</u> , DS 620244700A, 16 February 1987

1.3 <u>Terms and Abbreviations</u>

<u>American Standard Code for Information Interchange (ASCII)</u> : The character set defined by ANSI x3.4 and used by most computer vendors.

<u>Attribute</u> : A characteristic used to qualify an element within a document.

<u>Character Set</u> : A mapping of a character repertoire onto a code set such that each character is associated with its coded representation.

<u>Compound Document</u> : A document which may contain mixed content (text, graphics, etc.).

<u>Computer Graphics Metafile (CGM)</u> : A standard file format for the storage and retrieval of picture description information.

<u>Computer Program Configuration Item (CPCI)</u> : An aggregation of computer programs or any of their discrete portions, which satisfies an end-use function.

<u>Conforming SGML Application</u> : An SGML application that requires documents to be conforming SGML documents, and whose documentation meets the requirements of this International Standard.

<u>Context-Directed Editor</u> : An EDS application which guides the user through the process of document creation and revision by using the document type definition as a model for which logical elements may be included in the document.

<u>Descriptive Markup</u> : Information added to a document that enables an application program to process the document.

<u>Document Type Definition (DTD)</u> : Rules determined by an application that apply SGML to the markup of documents of a particular type. A document type definition includes a formal specification, expressed in a document type declaration, of the element types, element relationships and attributes, and references that can be represented by markup. It thereby defines the vocabulary of the markup for which SGML defines the syntax. A DTD can also include comments that describe the semantics of elements and attributes, and any application conventions.

<u>Electronic Documentation System (EDS)</u> : An integrated set of software tools and application programs which operate upon a document through various stages of a document life cycle consisting of editing (creating/revising), formatting, imaging, storage, and transfering.

<u>Element</u> : A component of the hierarchical structure defined by a document type definition; it is identified in a document instance by descriptive markup, usually a start-tag and end-tag.

<u>Element Declaration</u> : A markup declaration that contains the formal specification of the part of an element type definition that deals with the content and markup minimization.

<u>Entity</u> : A collection of characters that can be referenced as a unit.

<u>Entity Declaration</u> : A markup declaration that assigns an SGML name to an entity so that it can be referenced.

<u>Entity Reference</u> : A reference that is replaced by an entity.

<u>Field</u> : Two-dimensional space on a terminal screen.

<u>Form</u> : A structured view which may be imposed on windows or other forms. A form is composed of fields. These fields may be defined as forms, items, or windows.

Form Definition (FD) : Form definition Language after compilation. It is read at run-time by the Form Processor.

Form Definition Language (FDL) : The language in which electronic forms are defined.

Form Editor (FE) : A subset of the IISS User Interface that is used to create definitions of forms. The FE consists of the Forms Driven Form Editor and the Forms Language Compiler.

Form Hierarchy : A graphic representation of the way in which forms, items, and windows are related to their parent form.

Form Language Compiler (FLAN) : A subset of the FE that consists of a batch process that accepts a series of form definition language statements and produces form definition files as output.

Form Processor (FP) : A subset of the IISS User Interface that consists of a set of callable execution-time routines available to an application program for form processing.

Forms Driven Form Editor (FDFE) : A subset of the FE which consists of a forms-driven application used to create Form Definition files interactively.

Generic Identifier : A name that identifies the element type of an element.

GI : Generic Identifier.

IISS Function Screen : The first screen that is displayed after logon. It allows the user to specify the function to access and the device type and device name on which to work.

Integrated Information Support System (IISS) : A test computing environment used to investigate, demonstrate, and test the concepts of information management and information integration in the context of Aerospace Manufacturing. The IISS

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addresses the problems of integration of data resident on heterogeneous data bases supported by heterogeneous computers interconnected via a Local Area Network.

Item : A non-decomposable area of a form in which hard-coded descriptive text may be placed and the only defined areas where user data may be input/output.

Layout Style : The specification of format and presentation for logical elements.

Layout Structure : The hierarchy of all layout elements (pages, frames, blocks, etc.) for a document.

Logical Structure : The hierarchy of all logical elements (paragraphs, sections, etc.) within a document.

Markup : Text that is added to the data of a document in order to convey information about it.

Markup Minimization : A feature of SGML that allows markup to be minimized by shortening or omitting tags, or shortening entity references.

Message : Descriptive text which may be returned in the standard message line on the terminal screen. Messages are used to warn of errors or provide other user information.

Message Line : A line on the terminal screen that is used to display messages.

Operating System (OS) : Software supplied with a computer which allows it to supervize its own operations and manage access to hardware facilities such as memory and peripherals.

Page : Instance of forms in windows that are created whenever a form is added to a window.

Paging and Scrolling : A method which allows a form to

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contain more data than can be displayed at one time with provisions for viewing any portion of the data buffer.

Parser : An application program that determines how closely a document conforms to a document type definition which defines a specific documentation standard.

Physical Device : A hardware terminal.

Previous Cursor Position : The position of the cursor when the previous edit command was issued.

Qualified Name : The name of a form, item, or window preceded by the hierarchy path so that it is uniquely identified.

Standard Generalized Markup Language (SGML) : A language for describing document structures, consisting of descriptive markup which is added to a document to indicate where logical elements such as sections and paragraphs begin and end.

Subform : A form that is used within another form.

Tag : Descriptive markup indicating the start or end of a logical element.

Tagger : An application program which provides a mechanism for automatically tagging existing documents which have been created by word processing systems.

User Interface (UI) : IISS subsystem that controls the user's terminal and interfaces with the rest of the system. The UI consists of two major subsystems: The User Interface Development System (UIDS) and the User Interface Management System (UIMS).

User Interface Management System (UIMS) : The run-time UI. It consists of the Form Processor, Virtual Terminal, Application Interface, the User Interface Services, and the Text Editor.

User Interface Services (UIS) : A subset of the IISS User
Interface that consists of a package of routines that aid users
in controlling their environment. It includes message
management, change password, and application definition services.

User Interface/Virtual Terminal Interface (UI/VTI) :
Another name for the User Interface.

Virtual Terminal (VT) : A subset of the IISS User Interface
that performs the interfacing between different terminals and the
UI. This is done by defining a specific set of terminal features
and protocols which must be supported by the UI software which
constitutes the virtual terminal definition. Specific terminals
are then mapped against the virtual terminal software by specific
software modules written for each type of real terminal
supported.

Virtual Terminal Interface (VTI) : The callable interface
to the VT.

Window : Dynamic area of a terminal screen on which
predefined forms may be placed at run-time.

Window Manager : A facility which allows the following to
be manipulated: size and location of windows, the device on which
an application is running, the position of a form within a
window. It is part of the Form Processor.

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SECTION 2

DEVELOPMENT ACTIVITY

2.1   Statement of Pretest Activity

During system development, the computer programs were tested progressively. Functionality was incrementally tested, and as bugs were discovered by this testing, the software was corrected.

The starting point for the development of the EDS SGML Parser was a Parser implementation for the MS-DOS operating system developed by the National Bureau of Standards (NBS) as part of the CALS initiative. For EDS, the Parser was ported from MS-DOS to the operating systems supported by IISS. As the code was ported, changes were made to eliminate the use of temporary files, fix minor bugs, and add additional functionality needed to support EDS.

The NBS also developed an SGML Parser validation suite consisting of a number of files that test specific functionality outlined in the SGML standard (ISO 8879). The validation suite will serve as the basis for the EDS SGML Parser Unit Test Plan.

2.2   Pretest Activity Results

The EDS SGML Parser successfully passed the NBS validation suite. A few minor errors were found in the validation suite files themselves and these were corrected.

SECTION 3

SYSTEM DESCRIPTION

3.1   System Description

The SGML Parser is the component of the Electronic
Documentation System that validates the logical structure of a
document against a previously built SGML Document Type
Definition. It insures that the descriptive markup in the
document conforms to the set of rules defined by the DTD. The DTD
determines what generic identifiers are valid at any point in the
document and how many times they may occur.

In addition to validating the markup, the Parser also
converts the document to its fully marked up state by processing
all Entity references, Attributes, and expands all minimized
generic identifiers found within the document.

3.2   Testing Schedule

Since the NBS validation suite is the basis for the Parser
test plan, execution of this unit test plan is not dependent upon
any other components of either EDS or IISS.

3.3   First Location Testing

These tests of the SGML Parser require the following:

Equipment: Air Force VAX, terminals supported by the Virtual Te

Support Software: C run-time libraries

Personnel: one integrator familiar with EDS

Training: the EDS User Manual has been previously delivered

Deliverables: the SGML Parser CPCI

Test Materials: All tests are run using the NBS SGML validation suite files

Security Considerations: None.

3.4 Subsequent Location Testing

The requirements listed above must be met. The command procedure PARVAL.COM can be run to execute the entire NBS SGML validation suite. The output file PARVAL.TST can then be compared using the VAX DIFF command to the file PARVAL.SAV under IISS CM to insure that the unit test ran correctly.

SECTION 4

SPECIFICATIONS AND EVALUATIONS

4.1   Test Specification

The Unit Test Plan is based on covering specific functionality of the SGML Parser as outlined in the EDS Development Specification (DS) and the SGML ISO 8879 reference manual.

The Parser is tested by using the input files of the NBS validation suite. These files were developed to test the level of conformance and the correctness of Parser implementations to the SGML standard. Each validation suite test file tests one specific feature of the standard. The first set of files, listed in Appendix A and starting with the letter G, tests sequences of SGML language statements that are valid. No errors should be detected by the Parser when parsing any of the valid test cases. The second set of files, listed in Appendix B and starting with the letter I, are test sequences of SGML language statements that are invalid and should produce an error when they are parsed. To execute the validation suite, each file can be parsed individually by the tester, or a command procedure PARVAL.COM can be executed to parse all files at once.

The validation suite is the Unit Test for the EDS SGML Parser. The objective of the test is to insure that the SGML Parser parses all validation suite files in the correct manner.

4.2   Testing Methods and Constraints

The tests outlined in Section 5 can be executed in any order. The required input is given for each test in the form of a validation suite test file name. A list of the test files are given in Appendices A & B. Appendix A contains those tests that should run without error, while Appendix B contains those tests that should produce an error.

The tester can either manually parse one file at a time, or run a command file to execute the entire validation suite. The name of this command file is PARVAL.COM and is under IISS Configuration Management.

No additional constraints are placed on this unit test besides those listed in Sections 5.2 and 3.3 of this document.

4.3   Test Progression

The validation suite test files may be executed in any order.

4.4   Test Evaluation

The NBS validation suite test files are divided into two categories - test documents that should parse without error, and test documents that are invalid and should produce an error. The files that begin with the letter G should NOT produce any errors. The files that begin with the letter I SHOULD produce an error message.

The test results are evaluated by checking the Parser output to make sure that no error messages have been generated for G files and that error messages are generated for all I files.

The SGML Parser will stop parsing the test document and generate an error message of the form ERROR:... when an error in the document is found. The accuracy of this Unit Test Plan is dependent upon the observation by the tester of the output of the Parser.

If the tester runs PARVAL.COM then the output file PARVAL.TST is produced. This file may be compared to the file PARVAL.SAV under IISS Configuration Management using the VAX DIFF command. For the test to be sucessfull the files should match exactly.

SECTION 5

TEST PROCEDURES

5.1 Test Description

The Unit Test plan is executed by parsing all test documents listed in Appendices A and B and observing the output of the Parser for each test. As mentioned above, the test documents listed in Appendix A are valid SGML documents and should parse without error. Those listed in Appendix B are test documents that are invalid. The Parser should signal some error for each one of the test documents listed in Appendix B.

5.2 Test Control

A list of all validation suite test documents is provided in Appendices A and B. These test documents completely specify all input files necessary to test that the EDS SGML Parser can correctly parse documents that conform to the SGML standard and detect those documents that do not.

5.3 Test Procedures

To run the Unit Test Plan, the symbol SGML must be correctly set up to invoke execution of the program SGML.EXE. Assuming that the symbol is correctly set, then the tester must execute the following commands to parse a test document manually:

$SET DEFAULT   {directory containing the validation suite files}
$SGML {validation suite file name}

To execute the entire validation suite using the command procedure PARVAL.COM, the tester should execute the following commands:

$SET DEFAULT   {directory containing the validation suite files}

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```
$@PARVAL
$DIFF PARVAL.TST  PARVAL.SAV
```

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List of VALID NBS SGML Validation Suite Test Documents

G1.DAT;1	G10.DAT;1	G100.DAT;1	G101.DAT;1
G102.DAT;1	G103.DAT;1	G104.DAT;1	G105.DAT;1
G106.DAT;1	G107.DAT;1	G108.DAT;1	G109.DAT;1
G11.DAT;1	G110.DAT;1	G111.DAT;1	G112.DAT;1
G113.DAT;1	G114.DAT;1	G115.DAT;1	G116.DAT;1
G117.DAT;1	G118.DAT;1	G119.DAT;1	G12.DAT;1
G120.DAT;1	G121.DAT;1	G122.DAT;1	G123.DAT;1
G124.DAT;1	G125.DAT;1	G126.DAT;1	G127.DAT;1
G128.DAT;1	G129.DAT;1	G13.DAT;1	G130.DAT;1
G131.DAT;1	G132.DAT;1	G133.DAT;1	G134.DAT;1
G135.DAT;1	G136.DAT;1	G137.DAT;1	G138.DAT;1
G139.DAT;1	G14.DAT;1	G140.DAT;1	G141.DAT;1
G142.DAT;1	G143.DAT;1	G144.DAT;1	G145.DAT;1
G146.DAT;1	G147.DAT;1	G148.DAT;1	G149.DAT;1
G15.DAT;1	G150.DAT;1	G151.DAT;1	G152.DAT;1
G153.DAT;1	G154.DAT;1	G155.DAT;1	G156.DAT;1
G157.DAT;1	G158.DAT;1	G159.DAT;1	G16.DAT;1
G160.DAT;1	G161.DAT;1	G162.DAT;1	G163.DAT;1
G164.DAT;1	G165.DAT;1	G166.DAT;1	G167.DAT;1
G168.DAT;1	G169.DAT;1	G17.DAT;1	G170.DAT;1
G171.DAT;1	G172.DAT;1	G173.DAT;1	G174.DAT;1
G175.DAT;1	G176.DAT;1	G177.DAT;1	G178.DAT;1
G179.DAT;1	G18.DAT;1	G180.DAT;1	G181.DAT;1
G182.DAT;1	G183.DAT;1	G184.DAT;1	G185.DAT;1
G186.DAT;1	G187.DAT;1	G188.DAT;1	G189.DAT;1
G19.DAT;1	G190.DAT;1	G191.DAT;1	G192.DAT;1
G193.DAT;1	G194.DAT;1	G195.DAT;1	G196.DAT;1
G197.DAT;1	G198.DAT;1	G199.DAT;1	G2.DAT;1
G20.DAT;1	G200.DAT;1	G201.DAT;1	G202.DAT;1
G203.DAT;1	G204.DAT;1	G205.DAT;1	G206.DAT;1
G207.DAT;1	G208.DAT;1	G209.DAT;1	G21.DAT;1
G210.DAT;1	G211.DAT;1	G212.DAT;1	G213.DAT;1
G214.DAT;1	G22.DAT;1	G23.DAT;1	G24.DAT;1
G25.DAT;1	G26.DAT;1	G27.DAT;1	G28.DAT;1
G29.DAT;1	G3.DAT;1	G30.DAT;1	G31.DAT;1
G32.DAT;1	G33.DAT;1	G34.DAT;1	G35.DAT;1
G36.DAT;1	G37.DAT;1	G38.DAT;1	G39.DAT;1
G4.DAT;1	G40.DAT;1	G41.DAT;1	G42.DAT;1
G43.DAT;1	G44.DAT;1	G45.DAT;1	G46.DAT;1
G47.DAT;1	G48.DAT;1	G49.DAT;1	G5.DAT;1
G50.DAT;1	G51.DAT;1	G52.DAT;1	G53.DAT;1
G54.DAT;1	G55.DAT;1	G56.DAT;1	G57.DAT;1
G58.DAT;1	G59.DAT;1	G6.DAT;1	G60.DAT;1

G61.DAT;1	G62.DAT;1	G63.DAT;1	G64.DAT;1
G65.DAT;1	G66.DAT;1	G67.DAT;1	G68.DAT;1
G69.DAT;1	G7.DAT;1	G70.DAT;1	G71.DAT;1
G72.DAT;1	G73.DAT;1	G74.DAT;1	G75.DAT;1
G76.DAT;1	G77.DAT;1	G78.DAT;1	G79.DAT;1
G8.DAT;1	G80.DAT;1	G81.DAT;1	G82.DAT;1
G83.DAT;1	G84.DAT;1	G85.DAT;1	G86.DAT;1
G87.DAT;1	G88.DAT;1	G89.DAT;1	G9.DAT;1
G90.DAT;1	G91.DAT;1	G92.DAT;1	G93.DAT;1
G94.DAT;1	G95.DAT;1	G96.DAT;1	G97.DAT;1
G98.DAT;1	G99.DAT;1		

Total of 214 files.

List of INVALID NBS SGML Validation Suite Test Documents

I1.DAT;1	I10.DAT;1	I11.DAT;1	I12.DAT;1
I13.DAT;1	I14.DAT;1	I15.DAT;1	I16.DAT;1
I17.DAT;1	I18.DAT;1	I19.DAT;1	I2.DAT;1
I20.DAT;1	I21.DAT;1	I22.DAT;1	I23.DAT;1
I24.DAT;1	I25.DAT;1	I26.DAT;1	I27.DAT;1
I28.DAT;1	I29.DAT;1	I3.DAT;1	I30.DAT;1
I31.DAT;1	I32.DAT;1	I33.DAT;1	I34.DAT;1
I35.DAT;1	I36.DAT;1	I37.DAT;1	I38.DAT;1
I39.DAT;1	I4.DAT;1	I40.DAT;1	I41.DAT;1
I42.DAT;1	I43.DAT;1	I44.DAT;1	I45.DAT;1
I46.DAT;1	I47.DAT;1	I48.DAT;1	I49.DAT;1
I5.DAT;1	I50.DAT;1	I51.DAT;1	I52.DAT;1
I53.DAT;1	I54.DAT;1	I55.DAT;1	I56.DAT;1
I57.DAT;1	I58.DAT;1	I59.DAT;1	I6.DAT;1
I60.DAT;1	I61.DAT;1	I62.DAT;1	I63.DAT;1
I64.DAT;1	I65.DAT;1	I66.DAT;1	I67.DAT;1
I68.DAT;1	I69.DAT;1	I7.DAT;1	I70.DAT;1
I71.DAT;1	I72.DAT;1	I73.DAT;1	I74.DAT;1
I75.DAT;1	I76.DAT;1	I77.DAT;1	I78.DAT;1
I79.DAT;1	I8.DAT;1	I9.DAT;1	

Total of 79 files.